UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/716,316	NIE ET AL.
	Examiner	**Art Unit**	
	David N. Werner	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _15 October 2007_.

2a)☒ This action is **FINAL.**   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-18_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-18_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _17 November 2003_ is/are: a)☐ accepted or b)☒ objected.to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _20070802_.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

1.   This Office action for US Patent Application 10/716,316 is responsive to communications filed 15 October 2007, in reply to the non-final rejection of 03 April 2007. Currently, claims 1-18 are pending. Of those, claims 15-18 are new.

2.   In the prior Office action, claims 1, 2, 5, 6, 8, 9, 12, and 13 were provisionally rejected for non-statutory obviousness-type double patenting against co-pending application 10/716,265. Claims 3, 4, 10, and 11 were rejected under 35 U.S.C. 112, second paragraph, as being incomplete. Claims 8-14 were rejected under 35 U.S.C. 101 as directed to non-statutory subject matter. Claims 1-14 were rejected under 35 U.S.C. 101 as lacking patentable utility. Claims 5-7 and 12-14 were rejected under 35 U.S.C. 102(b) as anticipated by US Patent 6,160,846 A (Chiang et al.). Claims 1-4 and 8-11 were rejected under 35 U.S.C. 103(a) as obvious over Chiang et al. in view of US Patent 7,079,581 B2 (Noh et al.). Figure 1 was objected to for lacking a prior art caption, and the specification was objected to on informalities.

3.   Applicant's reply was received by the Office on 15 October 2007, which is after the expiration of the period for reply set in the last Office Action mailed on 03 April 2007. However, Applicant's showing of Office receipt of a timely response on 08 August 2007 with the appropriate petition for extension of time precludes this reply from being considered late.

Response to Arguments

4.   Applicant has itemized adverse elements of the prior Office action in presenting

arguments.   These arguments will be discussed below in accordance with the

applicant's arrangement.

I. Objection to the Drawings

Applicant traverses the characterization of Figure 1 as prior art, stating that while

the general system of figure 1 is known in the art, embodiments of the present invention

are implemented on the figure 1 system.   However, the statement on page 8: lines 14-

15 of the specification stating that "Figure 1 illustrates a high level block diagram of a

typical digital video encoder 100 **as is well known in the art**" (emphasis added)

precludes withdrawal of the objection to figure 1 as not labeled as prior at.   This

reference apparently admitting figure 1 to be prior art must be removed before this

objection may be withdrawn.   Preferably, the statement on page 6: line 6 should also

indicate that the apparatus illustrated on figure 1 is according to an embodiment of the

present invention. Therefore, the objection to figure 1 is respectfully maintained.

II. Objection to the Specification

Applicant's amendment to the specification has been fully considered.   The

objection to the specification for a minor informality has been withdrawn.

III. Double Patenting Rejection

At Applicant's request, the double-patenting rejection of claims 1, 2, 5, 8, 9, 12, and 13 has been held in abeyance until allowable subject matter is indicated.

IV. Rejection of claims 3-4 and 10-11 under 35 U.S.C. §112

Applicant's amendments to the claims have been fully considered. The rejection of claims 3, 4, 10, and 11 as incomplete has been withdrawn.

V(a). Rejection of claims 8-14 under 35 U.S.C. 101 as Non-Statutory

Applicant's amendments to claims 8, 9, and 12 have been fully considered. The rejection of claims 8-14 as directed to non-statutory subject matter has been withdrawn.

V(b). Rejection of claims 1-14 under 35 U.S.C. 101 as Lacking Patentable Utility

Applicant's amendments to claims 1, 5, 8, and 12 have been fully considered. The rejection of claims 1-14 as lacking patentable utility has been withdrawn.

VI. Rejection of claims 1-4 under 35 U.S.C. 103(a)

Applicant's arguments with respect to claims 1-4 have been fully considered but they are not persuasive. Applicant argues that Chiang et al. and Noh et al. do not disclose the claimed feature of "a scaling relaxation value" in claims 1-4. First, Applicant states that Chiang et al. and Noh et al. do not show setting a relaxation value "in order to prevent buffer overflow or underflow", and second, Applicant disagrees with

the assertion of deviation parameter D in Noh et al. as corresponding with the claimed

"scaling relaxation value".

In response to the first argument, figure 1 of Noh et al. shows a variable bit rate

(VBR) encoder that stores images in storage unit 90 through buffer 80 (column 3: lines

3-12). Additionally, Noh et al. states, in column 9: lines 1-7:

> To adjust a variation in the quantization factor, it is important to check the
> level of a buffer to see if overflow or underflow occurs in the buffer. For
> instance, if the level of the buffer reaches above a predetermined level,
> overflow may occur in the buffer. In this case, the present quantization
> factor is adjusted to be higher in a range of the maximum variation than
> the previous quantization factor.

Therefore, it is respectfully submitted that Noh et al. teaches the claimed limitation of

adjusting a scaling to prevent buffer underflow or overflow.

In response to the second argument, the fact that the deviation parameter D only

indirectly affects quantization factor $Q(t)$ through parameter K is irrelevant to the fact

that D adjusts quantization scaling based on a deviation from a target bit rate (column 8:

lines 31-35), which was known in the art at the time the invention was made to cause a

buffer to overflow or underflow. Alternatively, K, being directly proportional to D through

a limitation parameter L, may be interpreted as corresponding with the claimed

"relaxation value", as K adjusts the variation in a quantization factor (column 8: lines 47-

60). Therefore, the examiner respectfully maintains the prior art rejection on Noh et al.

For the purposes of clarity, the rejection of at least independent claim 1 under 35 U.S.C.

103(a) will be converted to a rejection under 35 U.S.C. 102(e) as anticipated by Noh et

al.

VII. Rejection of claims 5-7 under 35 U.S.C. 102(b)

Applicant's arguments with respect to claims 5-7 have been fully considered but they are not persuasive. Applicant argues that Chiang et al. does not teach the claimed limitation of "combining said complexity measure...to a running average complexity measure in a manner that prevents said current digital picture from significant changing said running average complexity measure", and specifically disagrees with the identification of complexity measure X in Chiang et al. as teaching this limitation.

In response, it is respectfully submitted that in Chiang et al., bit rate R_i for each macroblock, and bit rate T for an entire picture, may also be considered "complexity" measures, in accordance with the present invention. In the initial model of determining bit rate for a macroblock, bit rate R is directly proportional to picture complexity X and inversely proportional to quantizer scale Q (column 10: lines 35-37). In addition, the quantizer scale Q is initially determined as "an average of the quantizer scales used to code the macroblocks in the previous picture" (column 10: lines 65-67), and then adjusted to produce an optimal quantizer scale to maintain a constant visual quality (column 11: lines 1-7). Since bit rate R is directly dependent on Q, which in turn is dependent on an average of previous values of Q and is further modified to produce an optimal value to maintain a relatively constant image quality, and since R itself also is maintained to be relatively constant to prevent buffer overflow and underflow (column 13: lines 42-65), it is respectfully submitted that R satisfies the requirements of the claimed complexity measure. The rejection of claims 5-7 under 35 U.S.C. 102(b) as

anticipated by Chiang et al. will be updated to reflect the new interpretation of the reference.

VIII. Rejection of Claims 8-11 under 35 U.S.C. 103(a)

Applicant's arguments with respect to claims 8-11 have been considered but are not persuasive. Applicant's arguments are substantially similar to those of claims 1-4, which are co-extensive in scope, and have accordingly been rejected using the same grounds in the previous Office action. For the reasons described with respect to claims 1-4 in section VI above, at least claim 8 will be rejected under 35 U.S.C. 102(e) as anticipated by Noh et al.

IX. Rejection of claims 12-14 under 35 U.S.C. 102(b)

Applicant's arguments with respect to claims 12-14 have been considered but are not persuasive. Applicant's arguments are substantially similar to those of claims 5-7, which are co-extensive in scope, and have accordingly been rejected using the same grounds in the previous Office action. For the reasons described with respect to claims 5-7 in section VII above, the rejection of claims 12-14 under 35 U.S.C. 102(b) as anticipated by Chiang et al. is respectfully maintained.

X. New Claims 15-18

These claims are fully supported by the specification. It is noted that claims 15-18 appear directed to a narrower embodiment of the method of claims 1-4.

Drawings

5.   Figure 1 should be designated by a legend such as --Prior Art-- because only

that which is old is illustrated.   See MPEP § 608.02(g).   Corrected drawings in

compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid

abandonment of the application. The replacement sheet(s) should be labeled

"Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct

any portion of the drawing figures. If the changes are not accepted by the examiner, the

applicant will be notified and informed of any required corrective action in the next Office

action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

6.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7.   Claims 1, 2, 8, 9, 15, and 17 are rejected under 35 U.S.C. 102(e) as being

anticipated by US Patent 7,079,581 B2 (Noh et al). Noh et al. teaches a variable-bit-

rate (VBR) video encoder that models complexity based on motion vectors or mean

absolute difference of the encoded frames. Regarding claim 1, Noh et al. teaches calculating quantization factor Q of present frame t using deviation parameter D, which is based on the ratio of current bit rate to target bit rate (column 8: lines 4-53). Deviation parameter D determines the variation of quantization adjustment parameter K, which in turn allows for variation in the quantization factor (column 8: lines 48-60). This corresponds with the claimed "scaling relaxation value". The variation of the quantization factor, in turn, is driven at least to prevent buffer overflow and underflow (column 9: lines 1-7). Figure 8, lastly, shows that once the quantization factor and variation for a video object have been determined, the video object is encoded with the quantization factor (column 8: lines 54-58). This corresponds with the claimed "encoding digital video information".

Regarding claim 2, as mentioned previously, in Noh et al., a quantization factor is increased if the buffer usage level exceeds a predetermined amount (column 9: lines 1-7).

Regarding claim 15, in Noh et al., R is the number of bits to be allocated in a frame, originally based on the bit rate of the previous frame (column 5: lines 39-40), corresponding with the claimed "initial value for a bit budget", and with quantization factor determined based on threshold values of buffer fullness (column 9: lines 1-7), corresponding to the "initial value for a scale value based on a percentage of a memory buffer space used", and parameter r, determined as the deviation between the current bit rate and the target bit rate (column 8: lines 19-30), is a differential version of the claimed "final bit budget".

Regarding claims 9, 10, and 17, Noh et al. discloses a software embodiment (column 13: lines 52-64).

8.   Claims 5-7 and 12-14 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 6,160,846 A (Chiang et al.). Chiang et al. teaches a system for encoding a video that selects a quantizing scale to maintain video quality. Regarding claim 5, figure 2 of Chiang et al. shows coding method 200, which constrains the quantizing scale to control the bit rate. In the initial model of determining bit rate for a macroblock, bit rate R is directly proportional to picture complexity X and inversely proportional to quantizer scale Q (column 10: lines 35-37). Then, bit rate R corresponds to the claimed "complexity measure". In addition, the quantizer scale Q is initially determined as "an average of the quantizer scales used to code the macroblocks in the previous picture" (column 10: lines 65-67). This corresponds with the claimed "running average complexity measure", as bit rate R directly depends on quantizer scale Q. Finally, since Q is further modified to produce an optimal value to maintain a relatively constant image quality (column 11: lines 1-7), and since R itself also is maintained to be relatively constant to prevent buffer overflow and underflow (column 13: lines 42-65), this corresponds with the claimed preventing significant changing of complexity.

Regarding claim 6, bit rate depends on a buffer fullness measure (column 13: lines 42-65), and so must be constrained within a certain range to prevent buffer overflow and underflow.

Regarding claim 7, the quantizer scale is used to produce a quadratic or polynomial regression model of the complexity model of the picture, corresponding to the claimed "non-linear smoothing filter".

Regarding claims 12-14, Chiang et al. discloses a software embodiment (claims 18-23).

Claim Rejections - 35 USC § 103

9.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10.   Claims 3, 4, 10, 11, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noh et al.   Regarding claims 3, 4, and 10, and 11, Noh et al. calculates quantization factor $Q(t)$ as $(1 \pm K) \times Q(t-1)$, where K is the product of a limitation parameter and a deviation parameter (column 8: lines 4-14). Then a scaling value is calculated by subtracting the scaling value and a scaling relaxation value from the scaling value.

Noh et al. discloses the claimed invention except the present invention adds a relaxation factor as an extra term to the calculation of a scaling factor. However, it would have been an obvious matter of design choice to add an extra term to the equation of Noh et al., since Applicant has not disclosed that the exact algorithm claimed for adjusting a scaling factor solves any stated problem or is for any particular

purpose, and it appears that the invention would perform equally well using the algorithm of Noh et al.

Regarding claims 16 and 18, the quantization scale Qt of Noh et al. is set within a range of minimum and maximum values according to the MPEG-4 standard (column 7: lines 40-61). Then the setting of the "scale value" as between 0 and 1 is merely a normalization of a range, as is well-known in the art. Additionally, regarding the range of the relaxation value, it can be easily deduced that the limitations of deviation parameter D shown in equation 9 of Noh et al. (column 8: lines 8-10) show that $0 \leq D \leq 1$.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.
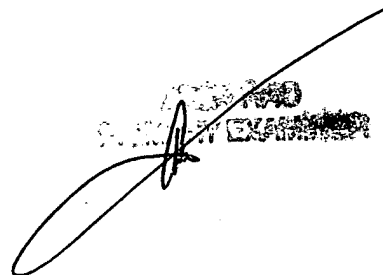
Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Werner whose telephone number is (571) 272-9662. The examiner can normally be reached on Monday-Friday from 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DNW